BUILD-UP MODEL AS A DISCOUNT RATE FOR A PRIVATE SECTOR INVESTMENT

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In this paper the author presents the build-up method as a discount rate for estimating a private sector investment, focusing on the rigorously estimation of the various risk premiums. The latter part presents an equity financed investment project launched on the domestic market, which is evaluated using the build-up model, starting from a similar project accomplished in USA, plus a range of specific risk premiums for Romania.

Keywords: build-up model, discount rate, capital budgeting, risk premium, country risk, cash flow

JEL clasification: G31: Capital Budgeting; Investment Policy

1. Introduction

In capital budgeting decisions, using the correct discount rate to find the present value of cash flows is a critical process. The cost of capital or discount rate catches the risk of a project and it is defined as "the expected rate of return that the market requires in order to attract funds to a particular investment"[1]. Investment decision has major consequences for the future development of a company. Assessing a project under uncertainty may be an extremely complex task. Uncertain future events which could affect the entire economy, a business or a project, lead to variable cash flows, which have different values that the projected ones under certainty, in a deterministic environment.

Beside cash flows estimation, assessing discount rate is very important for Discounted Cash Flows method(DCF). We choose to present the build-up method, as this is a discount rate method widely used for it's advantages, one of them being the elimination of beta with all it's inconveniences, found in the other pricing models. Although build-up method may seem simple and it's widely used by practioners, it must be applied with caution as the risk premiums must be rigorously estimated.

2. Build-up model

This model compounds the rate of return for a security (the discount rate) by adding different risk premiums to risk free rate. The traditional form for this model is:

$$E(R_i) = R_f + RP_m + RP_s + RP_u,$$

where RP_m is market risk premium, RP_s represents size premium and RP_u stands for unsystematic, firm specific risk. A new alternative[1] for the model also includes an industry specific risk premium (+/- RPi).

The build-up model has the important advantage of eliminating beta with all inconvenient that accompanies it. It is a simple model and this is the reason why many practitioners prefer it to other pricing models. Applying it is not such an easy task as we could think, because these risk premiums must be rigorously estimated.

Risk free rate (R_f) is represented only by income return gained by investors for 10, 20 or 30-year constant maturity bonds. Total return includes also capital gain return, which implies some risk and it is not appropriate for riskless asset.

Market risk premium (RPm) used for assessing discount rate is a forward looking concept, even if it is estimated from historical data. First, we have to choose a reliable market benchmark, usually a market index with a high coverage in number of industries and market capitalization (for example, S&P 500 is chosen to represent the US capital market). This time, rate of return for market portfolio is represented by total return, provided also by dividends and capital gain.
Another concerning aspect is how long should be the historical period for estimating market risk. A longer period presents the advantage that the analysis includes different past events, that may occur again in the future.
There are also disadvantages: using a longer period, the estimated value for market risk premium is affected with very high or very low values in some periods, because of events such as economic crisis, wars, that are not expected to happen again in the future period.
Annin and Falaschetti (1998) discussed about rolling average approach used in practice to estimate equity risk premium. The appraiser have to choose a significant window of historical data, calculates a risk premium, then moves the window one year forward and determines another premium. There are many disadvantages with this methodology. We do not know the exact length of the window for determining the rolling average (for USA, there were usually used 30-year data windows, because of changes in capital market in early '70s).
There are still many controversies and debate about equity risk premium, because of its impact on ultimate value derived under different approaches. The few risk premiums included in a model, the higher the impact of equity risk premium on discount rate (it decreases from CAPM and three-factor Fama-French to APT and build-up model).
It is widely recognized that small capitalization companies have higher expected returns than large companies in the same industry, because investors bear a higher risk. They expect to compensate this kind of risk through a specific risk premium called size premium.
Barad (2002) emphasized two approaches to measure size effect on return: first, there is a *small stock premium*, which captures the excess return for small companies to return expected for large companies; second, there is a *size premium*, focusing on isolating size effect on return of specific risk. The latest approach is used in developing the cost of capital for discounting purposes, in the buildup model, because it is more appropriate to catch return due to size effect and it is removed the possibility of twice capturing the risk, through different premiums.
Martin and Seigneur (2001) determined size premium as a margin between excess return to R_f (arithmetic average for actual return of a stock minus risk free rate) and excess return to R_f from CAPM (which is $\beta \times (R_M - R_f)$).
The additional risk captured by beta in CAPM is now integrated in the build-up model with a *company-specific risk premium* (RP_u).
To asses industry risk premium, we have to estimate first beta for that industry, which is a complex procedure, because some companies (usually the large capitalization ones) operate in more than one field and that is why their overall risk is lower. These companies are often excluded from analysis when beta is computed. *Kaplan and Peterson (1997)* performed a study and demonstrated (like other previous studies) that beta calculated with *pure play* method (when there are included in analysis only those companies that operate exclusively in one industry) is higher, because they are, in most cases, small and undiversified companies, and its risk is higher than industry average. The authors developed a *full information* methodology for including in industry beta determination those divisions of large, diversified companies that belong to industry in discussion.
Industry risk premium (+/- RPi) is determined as (beta industry × ERP) – ERP, where ERP represents equity risk premium and industry beta is calculated using full-information beta methodology.
If we use cost of capital computed from data for publicly traded companies, most of them held by minority stockholders (it is the case for cost of capital data published by Ibbotson Associates),

discount rate have to be adjusted with a risk premium for lack of liquidity (for privately held companies) and also for lack of control for minority shareholders, that can not influence company policies.
In estimating the discount rate we have to keep in mind some important aspescts:

free cash flows must be discounted with a risk-adjusted discount rate, which is a weighted average cost of capital (not only cost of equity capital);

each project has a specific risk structure and that is why we are not allowed to use the cost of capital for the company as discount rate for all new projects, but only for those investments that mentain the same pattern of risk like the overall firm;

cost of capital is in fact an estimation, which is more accurate if we use a cost of capital for entire industry (taking as a proxy firms with similar features) instead of cost of capital for the analyzed company;

we use nominal discount rate for nominal free cash flows, which means that we have to integrate expected inflation, even if not all components of cash flows are affected by inflation (amortization and depreciation, for example); we start estimation with a real rate and after that we transform it in a nominal rate, using anticipated inflation rate;

it is preferable to use arithmetic average than geometric mean for assessing expected returns or risk premiums, because the second is more appropriate for compound rate of return, but not for expected return;

3. Case study concerning assesment of build-up discount rate for a private sector investment

The objective of this section is to asses the discount rate for an investment in a polyurethan panels factory. A company from building materials industry, as unique shareholder of the new firm, fulfills the project. The project is all-equity financed.
The new company is privately held and for this industry we do not have enough information about traded companies in Romania, to use them as comparison to the cost of capital. Therefore, we proceed to a two stages procedure:

assessing discount rate for the project according to its risk category, assuming that it is accomplished in the United States of America (we chose USA because of data accessibility for estimating a proper discount rate);

assessing discount rate for the same project implemented in Romania, by adding some supplementary risk premiums to discount factor obtained in the first stage;

We start with risk free rate and then we add a range of risk premiums to reflect the level of risk for the analyzed project, in a **build-up model**.

A. Assessing discount rate for a similar project operated in USA

Expected rate of return for investor is computed with the following formula:

$$r = R_f + RP_m + RP_s + RP_i \text{ (industry)}$$

$\mathbf{R_f}$ is assimilated to yield to maturity for treasury bonds issued by US Treasury, with 20 years constant maturity**.** Annual average (at 31st of December, 2008) for daily quotations of yield to maturity for US Treasury bonds with 20-year constant maturity is 4.25%[1].
This average value represents expected return from two sources: income (coupon) and capital gain. The risk free rate corresponds only to the first component, because only debt payments promised by issuer to investor are riskless, while security price variations depend on changes in capital market.
$\mathbf{RP_m}$ stands for risk premium of capital market in USA and it is determined as excess return for market portfolio (S&P 500 index) to risk free rate. Rate of return for market

index S&P 500 is calculated as annualized average from average of monthly total return for a period of 120 months (Avg), as follows[1]: $R = (1 + Avg)^{12} - 1$

The annualized average return for S&P 500 for the last 10 years, at 31st of December 2008, was 8.91%, which leads to a market risk premium equal to 8.91%-4.25%= 4.66%.

RP_s+RP_i (industry) stands for size and industry premium and it represents the supplementary risk assumed by an investor in this industry, if the new firm is small or medium size, with different features compared to average firm from industry field.

Ibbotson Associates publishes annually statistics for each industry regarding cost of capital determined through different models (we also wrote, in parenthesis, the average values for the cost of capital of small/medium size companies in building materials industry[1]):

- *CAPM* takes into account only the systematic risk, measured by beta (13%);
- *CAPM + Size Premium* establishes a proper discount rate for the risk of small or medium companies (17.01%);
- *3-Factor Fama-French* uses market value of equity (MV), book-to-market ratio (BM) and a capital market factor for calculating expected return (17.9%);

The rate of return estimated with CAPM is not a reliable measure for the risk of the analyzed project. We have to choose between the second and the third model. As the two values are close enough, we appreciate that their average reflects more accurately the level of risk assumed by investor. The risk premium for size and industry in this case is 5.38% and the discount rate for a project in manufacturing industry, if it is implemented in USA by a small size firm, is 17.46%.

Concluding, the discount rate for the project cash flows in USA is:

$$4.25\%\% + 4.66\% + 5.38\% = 14.29\%$$

B. Assessing discount rate for the project operated in Romania

Estimating expected rate of return for investor starts with the rate of return for a similar project accomplished in USA, plus a range of specific risk premiums for Romania and for the new company:

$$\mathbf{r = rUSA + RP_{m(Supplementary\ for\ Romania)} + RP_{country\ risk\ for\ Romania} + RP_{i(supplementary\ for\ building\ industry\ in\ Romania)} + RP_{supplementary\ for\ minority\ shareholders}}$$

$RP_{m((Supplementary\ for\ Romania}$) catches supplementary risk assumed by an investor on Romanian capital market besides the case of a similar investment in US financial market. It is determined according to the surplus of risk taken on unit of return gained. We have determined the historical annualized rate of return and the standard deviation for BET from daily prices registered at Bucharest Stock Exchange, between 1st of January 1998 and 31st of December 2008. We used USD quotations forBET and the same formulas for mean and standard deviations (as well as for S&P 500 index) in order to get comparable results. We preferred the arithmetic mean to geometric mean, because it is thought that the first pictures better the annualized rate. Average return for this period is 24.5% and standard deviation is 49.77%. The quantity of risk on unit return gained is 2.03 (while the same ratio for US capital market is 1.75).

$RP_{capital\ market\ in\ Romania} = RP_{capital\ market\ in\ USA} \times$ risk on unit return for Romania/risk on unit return for USA = 4.66% × 2.03/1.75 = 5.4%, which corresponds to a **$RP_{m((Supplementary\ for\ Romania\ )}$** of 5.4%-4.66% = 0.74%.

Country risk (or sovereign) is not diversifiable because investors hardly can constitute a portfolio of securities issued in different countries. In this respect, a risk premium must pay for the country risk.

It could be determined as country default spreads, according to notes granted for the two countries by the main international rating agencies. Romania received for foreign currency bonds the following ratings from these agencies:
Standard&Poor's and **Fitch**: BB+/Negative[1], both worsened in october 2008, while **Moody's** is the only one which gives Baa3. USA rating is Aaa or AAA, which is the maximum note for all agencies (investment in US Treasury bonds is a safe one). According to sovereign ratings provided by Moody's[1], the country risk premium for government bonds noted with Aaa (USA) is zero, for Baa3 (Romania) is 2%, while for Ba1 is 3.25%.
We took Moody's as a reference because this agency did the most recent change of rating for Romania and improved its note to Baa3, in October 2008. This method offers a value of 2% for $\mathbf{RP}_{\textbf{country risk for Romania.}}$
Concerning the building materials industry, we estimate that for the specific field of producing polyurethan panels for warehouses there is a supplementary risk in Romania beside USA, because of the strong competition of similar products on the market. We refer here to polyesther and similar panels, imported or produced in Romania.
Therefore, we consider that $\mathbf{RP}_{\textbf{i(supplementary for building industry in Romania)}}$ is 2%. This value is subjectively fixed, without a rigorous appraisal, because of lack of data or detailed analyses concerning this specific industry in Romania.
The last component of discount rate is $\mathbf{RP}_{\textbf{supplementary for minority shareholders.}}$ It is needed only if there are many small stockholders that have no control on decisions adopted by majority shareholders. The new firm has a unique stockholder that decides alone the future strategy. From this perspective, a risk premium for minority shareholders is not necessary for the project.
We conclude that discount rate for the project operated in Romania is:

$$r = 14.29\% + 0.74\% + 2\% + 2\% = 19.03\%$$

4. Conclusions

Determining discount rate is an important aspect for every investment.. There are many discount rate models, some of them are unsophisticated but strongly disputed, and some of them are complex but little preferred by users. Choosing a model for estimating discount rate depends on available information and on user's reasons and preferences.
The discount rate estimated for the project consisting in a factory for industrial panels production must be taken with caution. The build-up model, presented in this paper, must be determined with caution, because every single risk premium is subjectively assessed. The more risk premiums to estimate, the little reliable the final result is. We can say how important these errors for a valuation process are only after we estimate the projected cash flows. Sensitivity analysis of the project reveals such information, because discount rate is one of the investment variables that must be modified (other variables are kept unchanged). The sensitivity of the project to the discount rate is given by the response of NPV and IRR to a change with one percentage point of discount factor.
If the project is sensitive to r, it means that a supplementary risk premium of 3% for building materials industry in Romania (instead of 2%) may drive to completely different conclusions concerning efficiency of the project or even the decision to adopt or to reject the project.
We chose this particular premium as an example because we mentioned before that it is not very well grounded.

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